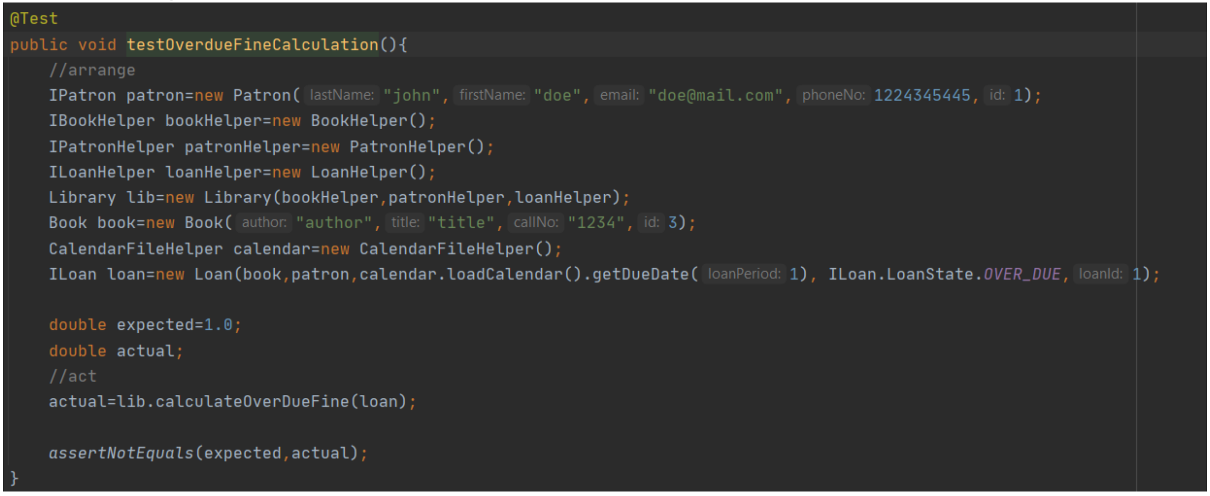
Simplification

The following tests have written to simplify testing of the bugs identified in the replication step above;

Bug 1: Incorrect calculation of fines.

The following screenshots shows the code.

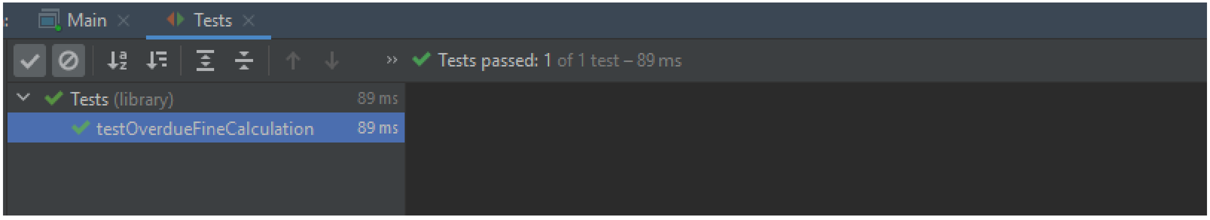


```
@Test
public void testOverdueFineCalculation(){
    //arrange
    IPatron patron=new Patron( lastName: "john", firstName: "doe", email: "doe@mail.com", phoneNo: 1224345445, id: 1);
    IBookHelper bookHelper=new BookHelper();
    IPatronHelper patronHelper=new PatronHelper();
    ILoanHelper loanHelper=new LoanHelper();
    Library lib=new Library(bookHelper,patronHelper,loanHelper);
    Book book=new Book( author: "author", title: "title", callNo: "1234", id: 3);
    CalendarFileHelper calendar=new CalendarFileHelper();
    ILoan loan=new Loan(book,patron,calendar.loadCalendar().getDueDate( loanPeriod: 1), ILoan.LoanState.OVER_DUE, loanId: 1);

    double expected=1.0;
    double actual;
    //act
    actual=lib.calculateOverDueFine(loan);

    assertNotEquals(expected,actual);
}
```

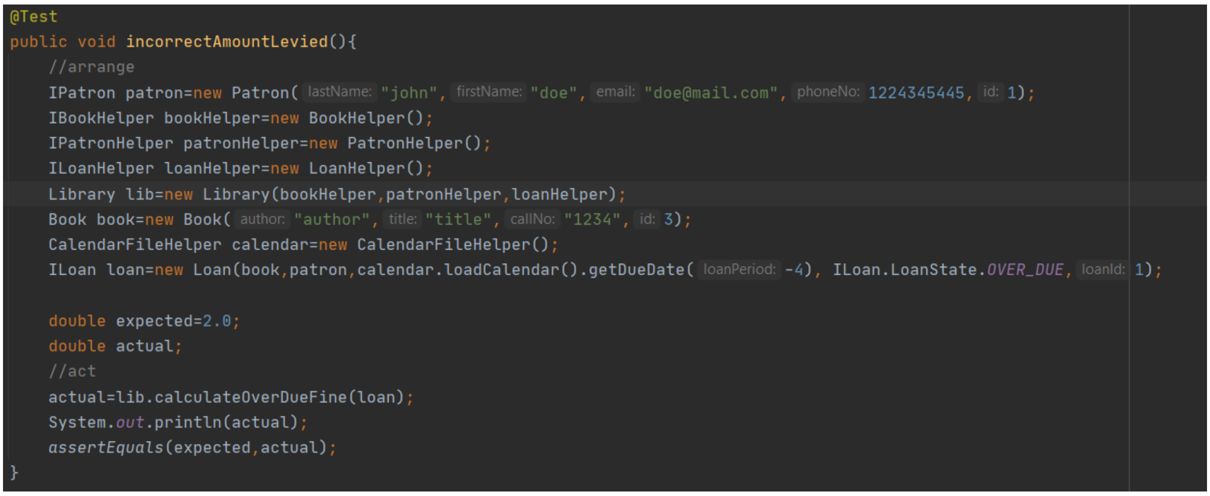
After running the test, it passes because a loan that is overdue by 1 day should have a fine of 1.0 but it returns 0.0 thus the test passes.



```
Tests passed: 1 of 1 test – 89 ms
Tests (library)                 89 ms
  testOverdueFineCalculation    89 ms
```

Bug 2: Incorrect fine amount levied.

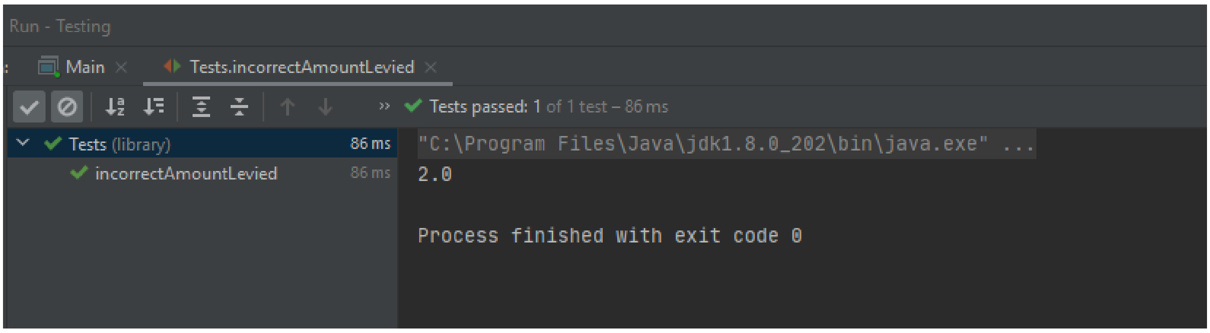
The screenshot below shows the code for the test.



```
@Test
public void incorrectAmountLevied(){
    //arrange
    IPatron patron=new Patron( lastName: "john", firstName: "doe", email: "doe@mail.com", phoneNo: 1224345445, id: 1);
    IBookHelper bookHelper=new BookHelper();
    IPatronHelper patronHelper=new PatronHelper();
    ILoanHelper loanHelper=new LoanHelper();
    Library lib=new Library(bookHelper,patronHelper,loanHelper);
    Book book=new Book( author: "author", title: "title", callNo: "1234", id: 3);
    CalendarFileHelper calendar=new CalendarFileHelper();
    ILoan loan=new Loan(book,patron,calendar.loadCalendar().getDueDate( loanPeriod: -4), ILoan.LoanState.OVER_DUE, loanId: 1);

    double expected=2.0;
    double actual;
    //act
    actual=lib.calculateOverDueFine(loan);
    System.out.println(actual);
    assertEquals(expected,actual);
}
```

When the test is ran, the amount that should be returned for a loan that is overdue by 2 days is 2.0 thus the test passes.

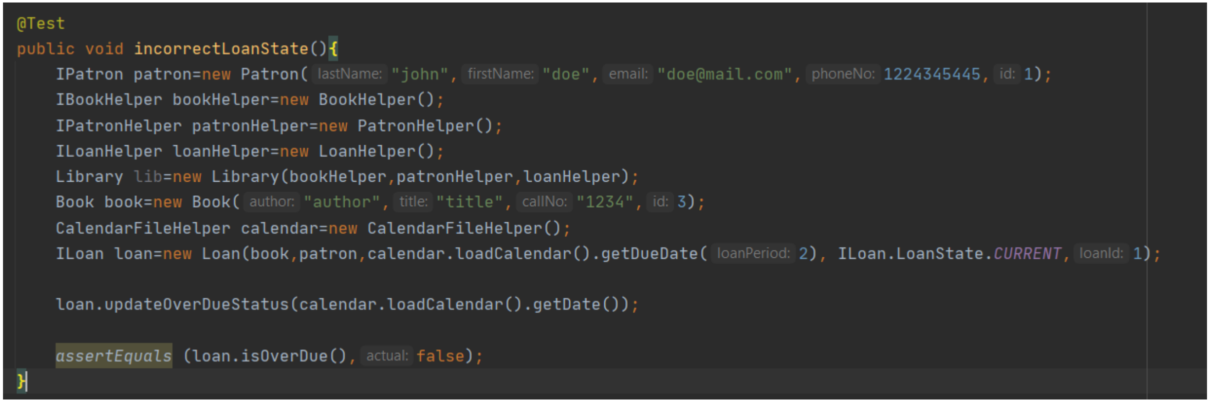

Run - Testing
Main
Tests.incorrectAmountLevied
Tests passed: 1 of 1 test – 86 ms
Tests (library) 86 ms
incorrectAmountLevied 86 ms

```
"C:\Program Files\Java\jdk1.8.0_202\bin\java.exe" ...
2.0

Process finished with exit code 0
```

Bug 3: Incorrect state of a loan

The screenshot below shows the code for the simplified test.

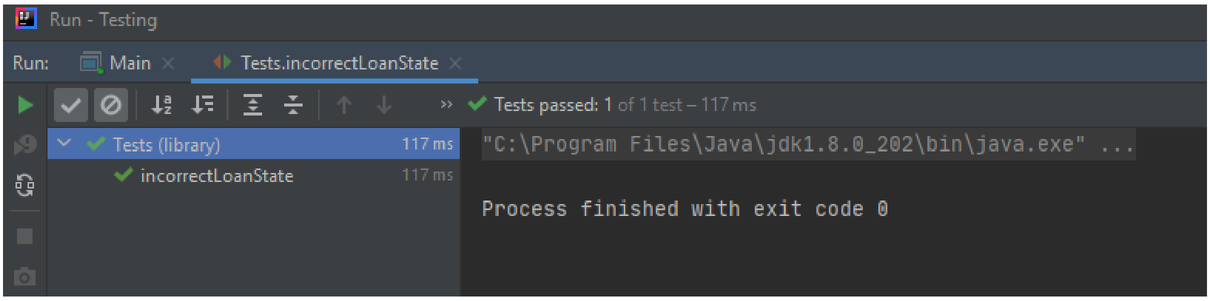


```
@Test
public void incorrectLoanState(){
    IPatron patron=new Patron( lastName: "john", firstName: "doe", email: "doe@mail.com", phoneNo: 1224345445, id: 1);
    IBookHelper bookHelper=new BookHelper();
    IPatronHelper patronHelper=new PatronHelper();
    ILoanHelper loanHelper=new LoanHelper();
    Library lib=new Library(bookHelper,patronHelper,loanHelper);
    Book book=new Book( author: "author", title: "title", callNo: "1234", id: 3);
    CalendarFileHelper calendar=new CalendarFileHelper();
    ILoan loan=new Loan(book,patron,calendar.loadCalendar().getDueDate( loanPeriod: 2), ILoan.LoanState.CURRENT, loanId: 1);

    loan.updateOverDueStatus(calendar.loadCalendar().getDate());

    assertEquals (loan.isOverDue(), actual: false);
}
```

When the test is ran it passes because the loan remains as current after updating the status based on the current date.

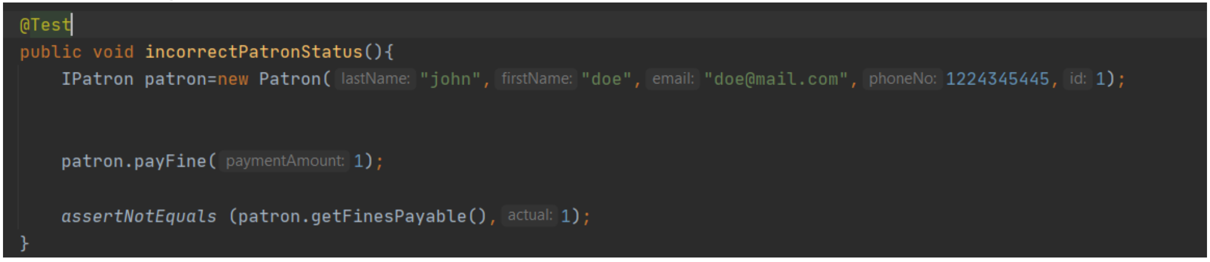


```
"C:\Program Files\Java\jdk1.8.0_202\bin\java.exe" ...

Process finished with exit code 0
```

Bug 4: Incorrect patron status

The following is the code for the test.

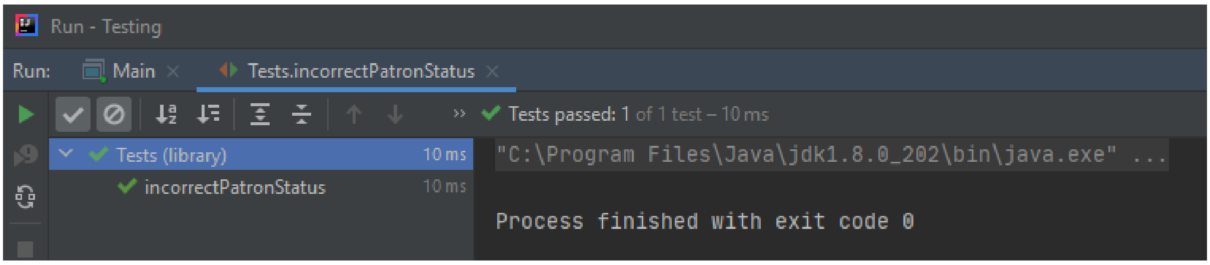


```
@Test
public void incorrectPatronStatus(){
    IPatron patron=new Patron( lastName: "john", firstName: "doe", email: "doe@mail.com", phoneNo: 1224345445, id: 1);


    patron.payFine( paymentAmount: 1);

    assertNotEquals (patron.getFinesPayable(), actual: 1);
}
```

The test passes because the amount after paying the fine the amount should be 0.



Tests passed: 1 of 1 test – 10 ms

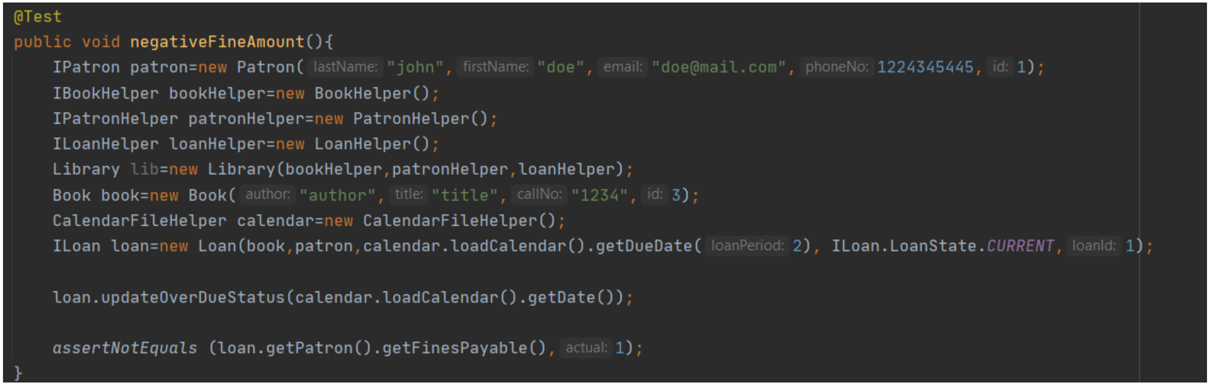
```
✓ Tests (library)            10 ms
   ✓ incorrectPatronStatus    10 ms
```

```
"C:\Program Files\Java\jdk1.8.0_202\bin\java.exe" ...

Process finished with exit code 0
```

Bug 5: Negative fine amount

The following is the code for the test.



```
@Test
public void negativeFineAmount(){
    IPatron patron=new Patron( lastName: "john", firstName: "doe", email: "doe@mail.com", phoneNo: 1224345445, id: 1);
    IBookHelper bookHelper=new BookHelper();
    IPatronHelper patronHelper=new PatronHelper();
    ILoanHelper loanHelper=new LoanHelper();
    Library lib=new Library(bookHelper,patronHelper,loanHelper);
    Book book=new Book( author: "author", title: "title", callNo: "1234", id: 3);
    CalendarFileHelper calendar=new CalendarFileHelper();
    ILoan loan=new Loan(book,patron,calendar.loadCalendar().getDueDate( loanPeriod: 2), ILoan.LoanState.CURRENT, loanId: 1);

    loan.updateOverDueStatus(calendar.loadCalendar().getDate());

    assertNotEquals (loan.getPatron().getFinesPayable(), actual: 1);
}
```

The test passed as shown in the screenshot below.

```
@Test
public void negativeFineAmount(){
    IPatron patron=new Patron( lastName: "john", firstName: "doe", email: "doe@mail.com", phoneNo: 1224345445, id: 1);
    IBookHelper bookHelper=new BookHelper();
    IPatronHelper patronHelper=new PatronHelper();
    ILoanHelper loanHelper=new LoanHelper();
    Library lib=new Library(bookHelper,patronHelper,loanHelper);
    Book book=new Book( author: "author", title: "title", callNo: "1234", id: 3);
    CalendarFileHelper calendar=new CalendarFileHelper();
    ILoan loan=new Loan(book,patron,calendar.loadCalendar().getDueDate( loanPeriod: 2), ILoan.LoanState.CURRENT, loanId: 1);

    loan.updateOverDueStatus(calendar.loadCalendar().getDate());

    assertNotEquals (loan.getPatron().getFinesPayable(), actual: 1);
}
```